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Standard Specification for Spray-Applied Fibrous Thermal Insulation for Elevated Temperature[1]

This standard is issued under the fixed designation C 720; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

$^{\epsilon 1}$ NOTE—The standard safety caveat and keywords were added in November 1994.

1. Scope

1.1 This specification covers the physical properties of a spray-applied fibrous insulation that consists of a mixture of heat-resistant binders and inorganic fiber. The binders may be either premixed with the fiber or added to the spray water. It is intended for application by spraying with controlled amounts of water to promote adhesion and, after drying, for use as a thermal insulation on surfaces operating at temperatures between 100°F (38°C) and 1800°F (982°C). The actual temperature limit shall be as specified or as agreed upon between the manufacturer and the purchaser.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values in parentheses are provided for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 168 Terminology Relating to Thermal Insulating Materials[2]

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus[2]

C 390 Criteria for Sampling and Acceptance for Preformed Thermal Insulation Lots[2]

C 411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation[2]

C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus[2]

E 84 Test Method for Surface Burning Characteristics of Building Materials[3]

E 605 Test Methods for Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members[3]

E 736 Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members[3]

E 761 Test Method for Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members[3]

3. Terminology

3.1 *Definitions*—Terminology C 168 shall be considered as applicable to this specification.

4. Materials and Manufacture

4.1 *Composition*—Sprayable fibrous insulation shall be composed predominantly of mineral or refractory fibers and a suitable proportion of inorganic, heat-resistant binder.

5. Physical Properties

5.1 The sprayed fibrous insulation shall conform to the physical properties specified in Table 1. Conformance shall be based on results of tests on specimens prepared in accordance with Section 8.

5.2 *Thickness*—Individual thickness measurements shall be within 15 % of the specified value.

5.3 *Density*—The dry density of the sprayed, fibrous insulation shall be within 15 % of the sample material used to determine compliance with the other physical requirements of this specification.

6. Workmanship, Finish, and Appearance

6.1 The surface shall be free of all visible defects that could adversely affect the service quality. The surface of the spray-applied insulation, while wet, may be compacted in using a suitable trowel or board.

7. Sampling

7.1 Sampling tests for qualification and inspection shall be in accordance with Criteria C 390. Specific provisions for sampling shall be agreed upon between the purchaser and the supplier.

8. Specimen Preparation

8.1 *Equipment*—Apply the fibrous insulation in accordance with manufacturer's recommendations.

8.2 *Preparation*—Spray specimens to a representative thickness onto a base specified in the test method using the manufacturer's recommended procedure.

8.3 When the specimen preparation procedure is described, such as in Test Methods C 177 or C 518, the

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[2] *Annual Book of ASTM Standards*, Vol 04.06.

[3] *Annual Book of ASTM Standards*, Vol 04.07.

TABLE 1 Physical Requirements

Compressive strength, average min, lbf/ft² (Pa) at 10 % deformation:	95 (4550)
Dry adhesion/cohesion to steel, min, lbf/ft² (kPa)	36 (1.7)
Flame spread index or classification, max	25
Smoke developed, max	50
Thermal conductivity, max, Btu/h·ft² (°F/in.) (W/m·K)	
At mean temperature of 200°F (93°C)	0.45 (0.065)
At mean temperature of 300°F (149°C)	0.50 (0.072)
At mean temperature of 400°F (204°C)	0.55 (0.079)
At mean temperature of 500°F (260°C)	0.60 (0.086)
At mean temperature of 600°F (315°C)	0.65 (0.094)
At mean temperature of 700°F (371°C)	0.70 (0.101)
At mean temperature of 800°F (427°C)	0.80 (0.115)
At mean temperature of 900°F (482°C)	0.90 (0.130)
Density—see 5.3[A]	

[A] Density varies among different products and may range from 12 to 15 lb/ft³ (192 to 240 kg/m³).

dimensions shall be selected to accommodate the test equipment available.

8.4 *Condition of Specimen*—Condition the prepared specimen for a period of not less than one week at room temperature, 68 ± 18°F (20 ± 10°C), and at a relative humidity not greater than 60 % until cured. Do not conduct the test sooner than 28 days after the completed application of the sprayed material.

9. Test Methods

9.1 *Thickness*—Use Test Methods E 605 to determine the thickness of the specimen.

9.2 *Density*—Use Test Methods E 605 to determine the density of the specimen.

9.3 *Compressive Strength*—Use Test Method E 761 to determine the compressive strength of the specimen. Report compressive strength at 10 % deformation or ultimate load, whichever is smaller.

9.4 *Thermal Conductivity*—Use Test Methods C 177 or C 518 to determine the apparent thermal conductivity of the specimen.

9.5 *Cohesion/Adhesion*—Use Test Method E 736 to determine the cohesion/adhesion of the specimen.

9.6 *Flammability*—Use Test Method E 84 to determine surface burning characteristics, flame spread index, and the smoke developed index.

9.7 *Temperature Resistance*—Use Test Method C 411 to determine the hot surface performance at the temperature agreed upon between the manufacturer and the purchaser.

10. Qualification Requirements

10.1 The following requirements are generally employed for the purpose of initial material or product qualification:

10.1.1 Compressive strength.

10.1.2 Dry adhesion.

10.1.3 Flame spread and smoke developed.

10.1.4 Thermal conductivity.

11. Inspection

11.1 The following requirements are generally employed for purposes of acceptance:

11.1.1 Density.

11.1.2 Thickness.

11.2 The inspection procedure shall be agreed upon between the purchaser and the seller as part of the purchase contract.

12. Rejection and Rehearing

12.1 *Rejection*—If the averages of the test data obtained on the pieces tested fail to conform to the requirements of this specification, rejection may be made in accordance with the following procedure.

12.1.1 The retest procedure shall apply to all properties listed in Table 1.

12.1.2 A second sample from the same lot shall be taken, prepared, and tested. The results of the retest shall be averaged with the results of the original test. If these average results do not comply with this specification, then a third test shall be called for and the results of the two that agree within stated limits are averaged.

12.1.3 Upon retest as described in 12.1.1, failure to conform to this specification shall constitute grounds for rejection.

12.1.4 In case of rejection, the manufacturer or supplier shall have the right to reinspect the rejected shipment and resubmit the lot after removal of that portion of the shipment not conforming to the specified requirements.

13. Packaging

13.1 Unless otherwise agreed or specified between the purchaser and the manufacturer or supplier, sprayable fibrous insulation shall be packaged in the manufacturer's standard commercial containers.

14. Keywords

14.1 elevated temperature; spray-applied; thermal insulation

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